Intestinal necrosis due to mesenteric ischemia in COVID-19 patients. Reviewing 3 patients have been treated at Cho Ray University Hospital

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Abstract

Introduction: The Covid-19 pandemic has resulted in severe complications and even death in many patients globally. Beside the most common impairments in the lung, SARS-CoV-2 infection-related hypercoagulation is not rarely seen in outpatients as well as in hospitalized patients. Such adverse event could engender vascular embolism in various viscera. During the Covid-19 outbreak in the years of 2020-2022, there have been several post-Covid-19 cases with bowel necrosis due to mesenteric ischemia which were well recorded worldwide. The impact of Covid-19 infection and mesenteric ischemia should be investigated.

Patients and methods: We reported three young patients aged less than 40 years old who were diagnosed with bowel necrosis after Covid-19 infection at our center. Clinical, paraclinical manifestations, computed tomography features, diagnosis, treatment and final outcomes were recorded.

Results: All three patients had mesenteric ischemia which caused intestinal necrosis in some extents. The patients underwent bowel resection with temporary stoma. Postoperative anticoagulant administration, nutritional support and delayed bowel reconstruction were performed with good outcomes.

Conclusion: Understanding the impact of Covid-19 infection on mesenteric vascular helps to prevent, early detect the occurrence of bowel necrosis and effectively treat this complication.

Keywords: Covid-19, SARS-CoV-2, mesenteric ischemia, bowel necrosis, compensation of bowel fluid.

Introduction

Infection with SARS-CoV-2 can lead to many serious complications in patients. Numerous reports in the world have recorded that occurrence of hypercoagulability causes vascular embolism and infarction of organs in the body such as cerebral infarction, myocardial infarction, limb ischemia, thoracic/abdominal aortic embolism, deep vein thrombosis, intestinal infarction...[1-4]. Intestinal ischemia due to mesenteric embolism is a rare condition but has serious and even fatal consequences for patients infected and post-infected with Covid-19 [5]. To date, the reports of intestinal necrosis due to mesenteric embolism in Covid-19 patients are few, most of them report one case or several cases and the vast majority were diagnosed during Covid-19 treatment. There are few reports of mesenteric embolism in recovered patients with SARS-CoV-19

infection (post-Covid-19 patients). However, there are some preliminary evidences of an increased risk of thromboembolism following Covid-19 infection [6]. Cho Ray Hospital, during the last pandemic period (2020-2022), treated a number of cases of bowel necrosis due to mesenteric ischemia; including many patients with a history related to Covid-19 or vaccinated against Covid-19. We report 3 cases of bowel necrosis due to mesenteric ischemia in patient infected with Covid-19 that have been compared with the literature to find out the clinical, paraclinical, treatment methods, and outcomes to contribute more experience in the diagnosis and treatment of an uncommon but serious disease and related to the current situation of the Covid-19 epidemic.

Clinical case report

First case

A 23-year-old male patient was admitted to the hospital because of abdominal pain for 3 days. Patient has epigastric pain spreading throughout the abdomen, nausea, anorexia, mild fever of 380C, black stools. The patient had no history of cardiovascular disease, never had surgery, and recovered from Covid-19 in September 2021. Examination revealed abdominal distension and resistance throughout the abdomen. WBC 20.85 G/L, Neutrophil: 87.2%, PT: 14.1 seconds. No lung lesions were seen on X-ray. Computed tomography showed thickening and edema of several small bowel loops, completed superior mesenteric veinous thrombosis (MVT).

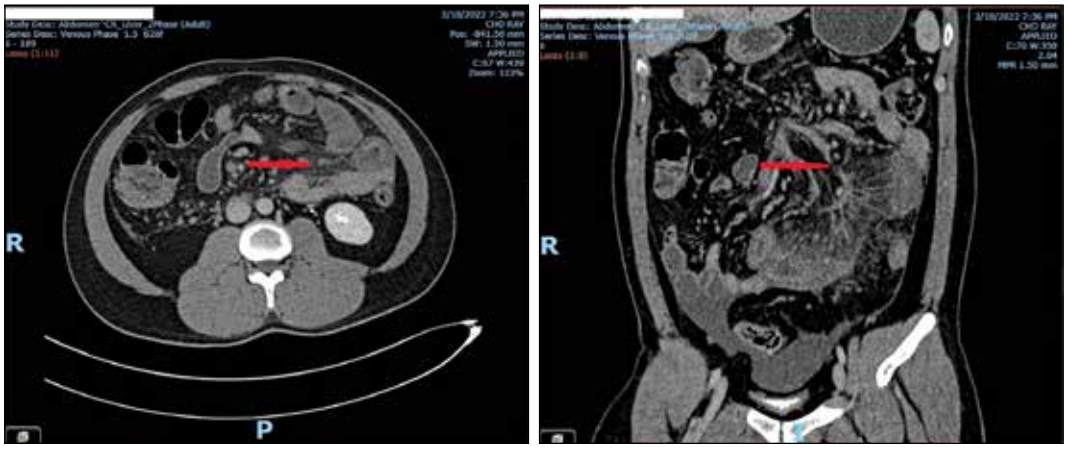

Figure 1: Completed the superior MVT (red arrow)

The patient underwent surgery for resection of 1 m of the necrotic small intestine with two ends to the skin (the upper end was 80 cm from the Treizt angle, the lower end was 1.4 m from the ileocecal angle), placed an ileostomy tube to collect and return back the output at the lower end. The patient was treated with intravenous antibiotics (carbapenem + metronidazole), antikinetic enoxaparine; Intravenous nutrition (3-pack of Nutriflex Peri) combined with gastrointestinal (Ensure Vital milk or Peptamen), return back the output of ileostomy. The patient was discharged after 6 days and restored intestinal tract after 1.5 months, thus, currently stable health.

Second case

A 36-year-old male patient was admitted to the hospital because of abdominal pain around the umlibical region and left iliac region with red bloody stools for 4 days and increases in intensity of pain. On physical examination, the abdomen was moderately distended, with tenderness around the umlibical and left iliac region. The patient had no history of cardiovascular disease and recovered from Covid-19 in March 2022. D-dimer test: 8842.97 ng/mL, WBC: 21.65 G/L, Neutrophil: 88.9%. Chest X-ray showed no lesions. Computed tomography: superior MVT, no superior mesenteric artery thrombosis, edema of the small bowel loops of the jejunum.

The patient underwent surgery to remove a 2.5 m of the necrotic jejunum, bringing the two ends to the skin (the upper end was 80 cm from the Treizt angle,

the lower end was 1.5 m from the ileocecal valve). Postoperative treatment with antibiotics (carbapenem + metronidazole), anticoagulant enoxaparin; intravenous nutrition (Nutriflex Peri) combined with gastrointestinal (Ensure Vital milk or Peptamen); return back the output of small bowel stoma. The patient was discharged after 7 days and has restored intestinal tract, thus, currently stable health.

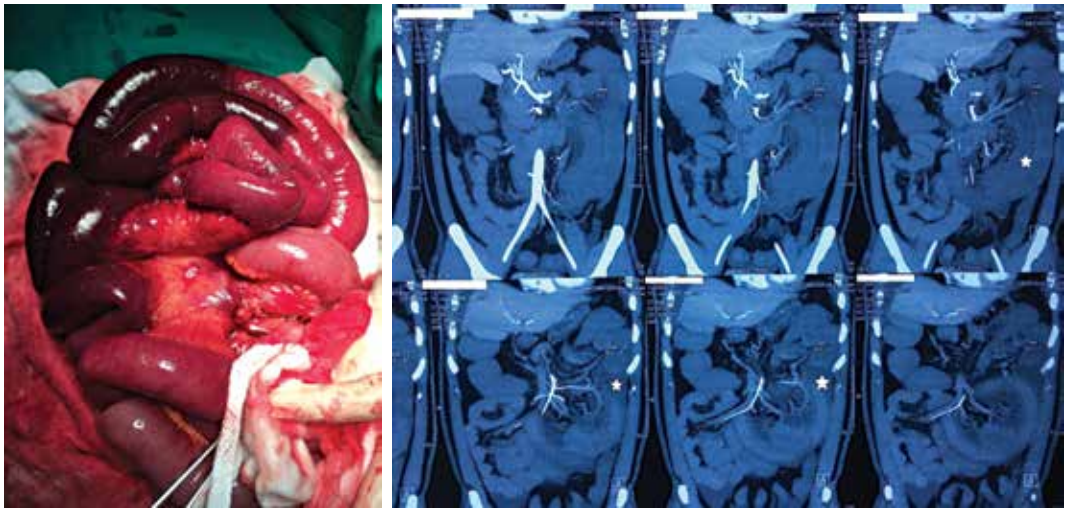

Figure 2: Small bowel necrosis (left image) and images of edema, small bowel ischemia on CT scan (white asterisk, right image).

Third case

A 27-year-old male patient started with epigastric and peri-umbilical abdominal pain accompanied by liquid stools with black blood. At the local hospital patient was diagnosed with small intestine necrosis due to thrombosis of the superior mesenteric vein. The patient underwent urgent surgery for resection of the necrotic ileum. After surgery, the patient still had severe abdominal pain, suspected of continued intestinal necrosis. WBC: 24.62 G/L, Neutrophil: 81.9%, PT: 17.2 seconds, INR: 1.31. Computed tomography: thrombosis of portal vein and superior MVT, diffuse wall thickening of small bowel loops with mesenteric edema, moderate volume of abdominal fluid. The patient was surgically resected with an additional 1.5 m of necrotic small intestine, bringing the two ends to the skin, returning the lower end. After surgery, the patient was treated with antibiotics (carbepenems + metronidazole), anticoagulants (enoxaparin and acenocoumarol); parenteral nutrition (Nutriflex Peri) and enteral nutrition (Ensure milk, Peptamen). The patient was discharged from the hospital after 8 days with stable health, his bowel tract has not been restored yet and needed to self-administers of intestinal output at home.

Figure 3. Patient with returning the intestinal output connected from the ileostomy at home

Discussion

All patients were young men (under 40 years of age), without a history of cardiovascular disease that might increase the risk of thromboembolism such as atrial fibrillation, valvular disease, atherosclerotic disease, disorders blood lipids, cancer, etc. All three patients were infected with Covid-19 and recovered within 6 months prior to this period. The patient also had 2 to 3 doses of Covid-19 vaccine and a negative Covid-19 rapid test upon admission. The main clinical symptom was abdominal pain around the umbilicus spreading throughout the abdomen with hematuria, abdominal distention, and signs of rebound tenderness. These findings are relatively similar to those reported previously except for hemolysis, which appeared later [4, 7, 8]. Laboratory tests show neutrophil predominance in white blood cells, increased D-dimer. Confirm the diagnosis by computed tomography with intravenous contrast. The difference from those reported internationally was that all three patients had superior MVT with or without associated portal vein thrombosis, without thrombosis of the superior mesenteric artery and its branches. The age of our patient group (under 40 years old) is also much younger than other reported cases in the world (over 50 years old) [4, 5, 7]. That further highlights the post-Covid-19 infection and embolism.

Disease progression from onset to diagnosis was 3-9 days. All three cases required resection of the small intestine due to necrosis, revascularization measures such as thrombectomy, fibrinolytic drugs were not feasible. This might be due to the late diagnosis (shown in all three patients with hemolysis), the bowel was no longer indicated for preservation. This is the difference between our patient group and other studies in the world. Compared with outpatients or post-Covid-19 patients, the diagnosis of thromboembolism was more timely in patients hospitalized for Covid-19 treatment, many of which are monitored at the ICU [2, 5]. Timely surgery is a decisive factor in treatment which can prevent patient from septic shock, and from the postoperative prognosis getting worse. The main surgical method is to resect the necrotic intestine and to make the intestinal stoma. One-stage intestinal anastomosis should not be done immediately to avoid the risk of necrosis continuing without follow-up as in the third patient. However, bringing the small intestine to the skin also has advantages and disadvantages. The advantage is to help monitor the vital status of the intestine through color, tone, ability to excrete faeces of the stoma to the skin; thereby helping to detect early necrosis to avoid unnecessary second look. The main disadvantage is that it disrupts the digestive tract, causing loss of water, electrolytes, and nutrients. This is also the main postoperative risk of the patient: malabsorption, short bowel syndrome, increased risk of infection. Therefore, the main treatment is broad-spectrum antibiotics to fight infection, return back the intestinal fluid to limit dehydration, electrolytes and nutrient fluid loss. It is necessary to start early support parenteral nutrition with parenteral nutrition (ensure adequate energy, sugar, protein, lipid, vitamins and microelements) and gradually switch to enteral feeding as soon as possible.

Anticoagulation still plays a role in preventing new thrombosis from causing further necrosis. In the hospital, preference should be given to low molecular weight heparin (LMWH), with or without a vitamin K inhibitor (warfarin, acenocoumarol). Interim regimens at many centers around the world also choose LMWH [3, 9]. When the patient is discharged from the hospital, the patient can be switched to oral anticoagulation. We usually choose vitamin K antagonists (such as acenocoumarol) while in the world it is recommended to use other drugs such as anti-factor Xa drugs (rivaroxaban, fondaparinux). We currently treat anticoagulation according to the protocol of the Vietnam Cardiology Association [3, 10, 11]. The duration of maintenance anticoagulation is unknown in this case, in fact it can be used for 3-6 months. During treatment, it is necessary to closely monitor the coagulation function to avoid postoperative bleeding complications [8].

Another issue is when to restore the patient's intestinal tract. Usually, we only indicate the restoration of intestinal tract when two conditions are met: (1) There is no longer a risk of continued necrosis; (2) Restore intestinal tract as soon as conditions permit. The meaning of the time to restore intestinal tract is to avoid the patient's prolonged loss of digestive juices, and partly to improve the short bowel syndrome, to help the patient return to normal activities and work.

Table 1: Summary of clinical, paraclinical, treatment and progress of the patients

No.	Age/ gender	Covid Status history	Symptoms	Diagnosis day	Specific signs	Other thrombosis position	Treatment	Covid-19 treatment	Outcome
Patient 1 Admission: 10/3/2022	24, male	Infected covd and recoverin 9/2021	Epigastric abdominal pain, vomiting, Fever 38°C	Day 3	Complete thrombosis of the superior mesenteric vein, thickening and edema of several loops of small intestine	No	Removal of 1 m of jejunum and ileostomy	No	Restored intestinal tract on, healthy
Patient 2 Admission: 7/4/2022	36, male	Infected covd and recover in 3/2022	Abdominal pain around umlibical region, red liquid bloody stools	Day 4	Thrombosis of the superior mesenteric vein,, thickening and edema of the small bowel loop of the jejunum, surrounding fat infiltration, moderate abdominal fluid	portal vein thrombosis	Removal of 2.5 m of small intestine and ileostomy	No	Restored intestinal tract, healthy
Patient 3 Admission: 6/9/2022	28, male	Infected with and recovered 2/2022	Abdominal pain, vomiting, bloody stools	Day 9 (thrombosis persists)	Thrombosis of portal vein , superior mesenteric vein, diffuse edematous wall of small bowel loops	No	Resection of another 1.5 m of necrotic jejunum immediately	No	Restored intestinal tract, healthy

Conclusion

Mesenteric ischemia causing intestinal necrosis is an uncommon but dangerous complication in patients after SARS-CoV-2 infection. Attention should be paid to this complication in patients with Covid-19 who have symptoms of suspected mesenteric thrombosis in order to diagnose and treat promptly, to avoid bowel necrosis. Treat intestinal necrosis with small bowel resection, postoperative anticoagulation, supportive nutrition, and return of

intestinal juices. Early restoration of gastrointestinal tract when thromboembolism is under control.

Conflict of interest: The authors declare that they have no conflict of interest.

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